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DIVISION 02 - SITE CONSTRUCTION

SECTION 02826J

CHAIN LINK FENCES AND GATES

02/05

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SECTION 02826J

CHAIN LINK FENCES AND GATES  
02/05

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This specification is written to meet the requirements of the ASTM standards and not the Federal Specification RR-F-191K(which includes reference to RR-F-191-1D, 2D, 3D and 4D).

This specification is written for hot dipped galvanized, steel fences with swing gates made of round pipe sections in accordance with Material Group 1A of ASTM F 1043. Fence height is considered to be less than or equal to 12 feet.

This specification is written to meet the minimum requirements of the ASTM standards, but requires engineering calculations to substantiate the fence design chosen. If slats or wind screening are to be installed in or on the chain link fabric, ensure Installation Drawings consider selection of larger size fence posts, rails, and bracing; increasing the size of post footings; decreasing the spacing of line post; decreasing the spacing of the tie wires or other fasteners securing the fabric to the framework; or various combinations of these measures to withstand the additional wind load placed on the fence.

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PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

From a single source, provide a complete fencing system make up of chain link fence fabric [with pre-inserted polyethylene slats], framework, fittings, gate hardware, and incidental accessory items.

1.2 SYSTEM DESIGN

- a. Provide project calculations that indicate fence and gate design is adequate to resist the applied design loads and that gate assemblies meet the deflection criteria set forth in ASTM F 900. Design loads are indicated on the drawings.
- b. [Install Privacy slats in the chain link fabric of this fencing system project. Ensure that the increased wind loading due to the decrease chain link fence fabric open area is accounted for in the fencing design. Consider selection of larger size fence posts, rails, and bracing; increasing the size of post footings; decreasing the spacing of line post; decreasing the spacing of the tie wires or other fasteners securing the fabric to the framework; or various combinations

of these measures to withstand the additional wind load placed on the fence.]

### 1.3 QUALITY ASSURANCE

- a. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years documented experience.
- b. Warranty: A written single system warranty from the manufacturer of the product and a written installation warranty from the Contractor, both providing complete coverage for a minimum of 12 years. Warrant fence components, including foundations against structural failure that occurs as a result of applied loadings at or below the design loads regardless of whether the fence coating is a contributing factor. Also, provide a warranty against excessive corrosion.

### 1.4 REFERENCES

\*\*\*\*\*  
**NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.**  
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The publications listed below form a part of this section to the extent referenced:

#### ASTM INTERNATIONAL (ASTM)

ASTM A 121	(1999) Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire
ASTM A 153	(2003) Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
ASTM A 392	(2003) Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A 780	(2001) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 817	(2003) Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire
ASTM A 824	(2001) Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use With Chain Link Fence
ASTM C 94/C 94M	(2003a) Standard Specification for Ready-Mixed Concrete
ASTM F 1043	(2000) Standard Specification for Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework

ASTM F 1083	(1997; R2003) Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F 567	(2000) Standard Practice for Installation of Chain-Link Fence
ASTM F 626	(1996a; R 2003) Standard Specification for Fence Fittings
ASTM F 900	(2003) Standard Specification for Industrial and Commercial Swing Gates

## 1.5 SUBMITTALS

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**NOTE: Review submittal description (SD) definitions in Section 01300, "Submittals," and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.**  
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The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

### SD-01 Preconstruction Submittals

Installer Qualifications

### SD-02 Shop Drawings

Submit erection/installation drawings for the following items in accordance with paragraph entitled, "Assembly and Installation," of this section.

Fence Assembly  
 Gate Assembly  
 Gate Hardware

### SD-03 Product Data

Submit a sample of the warranty language for the single system warranty from the manufacturer of the product and the written installation warranty from the Contractor.

### SD-05 Design Data

Submit calculations validating the fence and gate design indicated on the drawings.

### SD-07 Certificates

Submit certificates of compliance in accordance with the

applicable reference standards and descriptions of this section for the following items:

Chain Link Fabric  
Fence Posts, Rails, and Bracing  
Fence Accessories  
Gates  
Concrete

#### SD-08 Manufacturer's Instructions

Submit manufacturer's maintenance instructions for the following items:

Gate Assembly  
Gate Hardware

#### SD-11 Closeout Submittals

Submit the single system warranty from the manufacturer of the product and a written warranty from the Contractor.

### 1.6 ASSEMBLY AND INSTALLATION

- a. Provide manufacturer's instructions that detail proper maintenance for gate assembly and gate hardware.
- b. Provide erection/installation drawings along with certificates of compliance for complete fence assembly and gate assembly.

## PART 2 PRODUCTS

### 2.1 GENERAL

Conform to the fencing materials requirements of ASTM A 392, ASTM F 1043, ASTM F 1083, ASTM F 626, ASTM F 900, and as specified herein.

### 2.2 ZINC COATING

- a. Hot-dip galvanize Ferrous-metal components and accessories after fabrication.
- b. Conform to the following requirements for zinc coatings:

Pipe: Type A, internal and external, in accordance with ASTM F 1043.

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NOTE: Fence fabric galvanized after fabrication is normally not produced with Class 2 coating on 11 gage or 11-1/2 gage wire. Note that a discrepancy exists between ASTM A 392-03 and ASTM A 817-03 for coating class of chain link fence wire coated before the weaving process.  
\*\*\*\*\*

Chain Link Fabric: Class 2 in accordance with ASTM A 392.

Fence Accessories: In accordance with ASTM F 626.

Tension Wire: Type II, Class 4 in accordance with ASTM A 824 and ASTM A 817.

Barbed Wire: Type Z, Class 3 in accordance with ASTM A 121.

Gate Hardware: In accordance with ASTM A 153 for the material class corresponding to the hardware of consideration.

- c. Cold-apply zinc-rich coating galvanizing-repair material in conformance with ASTM A 780.

## 2.3 CHAIN LINK FABRIC

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NOTE: One (1) inchTwenty-five point four (25.4) millimeters mesh comes in 9 or 11 gage coated wire size; 1-3/4 inch44.45 millimeters mesh comes in 11 gage coated wire size; 2 inch50.8 millimeters mesh comes in 6, 9, or 11 gage coated wire size; 2-1/8 inch54 millimeters mesh comes in 11-1/2 gage coated wire size. Chain link fence fabric with privacy slats will normally be 2 inch50.8 millimeters mesh size with slats pre-installed at the time of manufacturing.

\*\*\*\*\*

- a. Provide fabric with No. [6] [9] [11] [11-1/2]-gage wires woven into a [1] [1-3/4] [2] [2-1/8]-inch[25.4] [44.45] [50.8] [54] millimeter diamond mesh with dimensions of fabric and wire conforming to ASTM A 392.
- b. Provide fabric fabricated as one continuous piece for the full height of the fence [with privacy slats pre-inserted at the time of manufacturing].
- c. Provide fabric knuckled on both top and bottom selvages, except that fabrics with mesh sizes of 2-inches50.8 millimeters or more, and heights of 72-inches182.88 centimeters and over may be twisted on the top selvege and knuckled on bottom selvege.
- d. Use the same fabric configuration for both the fence and gate.

## 2.4 FENCE FRAMEWORK

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All fences should have either a top rail or top tension wire. Tension wire is not used as an intermediate horizontal rail. An intermediate rail should always be specified on a 12 foot3.66 meters high fence, and may be specified on fences less than 12 feet3.66 meters in height when conditions warrant. A bottom rail or bottom tension wire is optional but recommended for better security. A bottom horizontal member should be specified on any fence constructed with slats.

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- a. Provide round steel pipe members in accordance with ASTM F 1043, Material Group 1A. [The top [and bottom] horizontal fence member may be tension wire.] [A bottom [and intermediate] horizontal fence member is not required.]

- b. Size pipes by structural calculations to resist the indicated design loads, but in no case use pipes smaller than the minimum size indicated for Material Group 1A fence framework in ASTM F 1043.

## 2.5 TERMINAL POST BRACING

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NOTES: Brace rails are required on any fence  
constructed without a top rail, and on all fences  
over 6 feet1.83 meters in height.  
\*\*\*\*\*

Provide round steel pipe members meeting the material requirements of ASTM F 1043, Group 1A and sized by structural calculations to resist the indicated design loads.

## 2.6 GATE POST AND GATE FRAMEWORK

- a. Provide round steel pipe members in accordance with ASTM F 1043, Material Group 1A. Gate construction can be either corner welded or corner fittings. When used, fabricate corner fittings with galvanized steel.
- b. Size pipes by structural calculations to resist the indicated design loads, but in no case use pipes smaller than the minimum size indicated for round steel pipe gate post and gate frame members in ASTM F 900.

## 2.7 GATE HARDWARE

- a. Use [single][double] swing type gates with [180 degrees outward][180 degrees inward][90 degrees in and out] swing. Provide gate hardware that includes the necessary components for a fully functional gate of the type specified, and that conforms to the requirements of ASTM F 900.
- b. Provide gate hardware constructed of malleable iron, forged steel, or pressed steel of sufficient strength and durability to support the gate and repeated open-close cycles. Do not use lift-off type hinges.

## 2.8 TENSION WIRE

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Note: Tension wire is specified as only one size (  
0.177 inch4.5 millimeters diameter).  
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Provide tension wire conforming to the requirements of ASTM A 824.

## 2.9 BARBED WIRE

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Note: Barbed wire covered under ASTM A 121 always  
consists of a stand of two (2) wires. The design  
number relates to the construction of barbed wire  
with the number in sequential order designating the  
wire gage of the strand wires, the number of barb  
points, spacing of barbs, wire gage of the barbs,  
and a letter indicating the shape of the barbs.  
There are two (2) grades of barbed wire: standard

grade which has barbs spaced on 4 or 5 inch10.16 or 12.7 centimeter centers, and high security grade which has barbs spaced on 3 inch7.62 centimeter centers. All design numbers except one (1) relate to standard grade barbed wire; the one high security grade barbed wire is manufactured only from aluminum coated strand (Coating Type A).

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Provide barbed wire conforming to the requirements of ASTM A 121, Design Number 12-4-5-14R.

## 2.10 FENCE ACCESSORIES

- a. Provide fence accessories fabricated from steel and conforming to the requirements of ASTM F 626. It is acceptable for post caps, rail and brace ends, and barbed wire arms to be fabricated from cast iron.
- b. Provide a cap for each post. [Provide line post caps with a loop for positioning the top rail.] [Provide caps with provisions for barbed wire when necessary.] [Barbed wire supporting arms do not require post caps.]
- c. Use minimum of 9-gage, standard round wire ties for attaching chain link fabric to line post [and horizontal rail(s).] [, and use minimum of 12-gage, round wire hog rings for attaching chain link fabric to horizontal tension wire.] Manufacturer's standard tie or clip practice will be accepted if documentation is provided that indicates equal, or better, strength and durability.
- d. [Provide expansion sleeve with spring at each joint in top rail to allow for expansion and contraction of the top rail.]
- e. Provide tension bars where chain link fabric meets terminal posts of fence, and on all perimeter framework for gates.

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Type I: Single slanted arm for three (3) barbed wire strands. Type II: Single vertical arm for three (3) barbed wire strands. Type III: V-shaped arm for six (6) barbed wire strands. Type IV: A-shaped arm for five (5) barbed wire strands.

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- f. [Provide Type [I][II][III][IV] barbed wire arms.] [Provide intermediate arms with hole for passage of top rail.]

## 2.11 PRIVACY SLATS

- a. Provide double wall, self-locking, privacy slats that fit tight in the chain link fence fabric, and provide a minimum of 75% screening for the total height of the fence fabric.
- b. Provide slats manufactured from virgin, high-density polyethylene with ultraviolet inhibitors and the following properties:
  1. Slat Thickness: Approximately 5/16 inch7.94 millimeters
  2. Wall Thickness: Approximately 0.030 inch0.76 millimeter
  3. Slat Width: Varies with fence fabric mesh size and wire gage



4. Melt Index: 0.34
5. Specific Gravity: 0.951
6. Low Temperature Brittleness: -76 degrees F24.44 degrees C
7. Tensile strength: 3700 psi25.51 megapascal
8. Heat Distortion: 250 degrees F121.11 degrees C

c. Provide slats [white][gray] in color.

## 2.12 CONCRETE

Provide concrete conforming to ASTM C 94/C 94M with a mix designed to obtain a minimum 28-day compressive strength of 3,000 psi20.68 megapascal.

## PART 3 EXECUTION

### 3.1 GENERAL

- a. Install the fence and gate assembly, where indicated on the drawings, in accordance with ASTM F 567, the manufacturer's written instructions, and the additional information provided below.
- b. Complete final grading and establish finish elevations in the locations of the fence lines prior to beginning fencing installation.
- c. Verify location of underground utilities indicated on the drawings in the vicinity of the fencing system installation area prior to beginning excavations. Although it is unlikely that undocumented underground utilities exist, use caution when excavating in case unforeseen underground utilities are encountered.
- d. [Spread soil from excavation uniformly adjacent to the fence line or on areas of government property, as directed.] [Remove soil from excavation from government property.]

### 3.2 POST FOUNDATIONS

- a. Drill holes for post foundations in firm, undisturbed soil or compacted soil.
- b. If underlying soft or loose soils are encountered during excavation, and these conditions were not already accounted for in the fence post foundation design, contact the engineer of record for the fencing system to adjust the foundation sizes. Submit written documentation to the Contract Administrator of changes made to the installation drawings.
- c. Prior to placing the concrete, remove loose or foreign materials from the holes, and moisten the soil.
- d. Extend foundations 2 inches50.8 millimeters above grade and apply a trowel finish to the tops of foundations. Slope the foundation tops to shed water away from posts.
- e. Keep exposed concrete moist for at least 7 days after placement or cure with a membrane curing material.
- f. Sample and test concrete as specified in Section 03305J, "Cast-In-Place Concrete (Short Section)" to determine concrete strength.

### 3.3 FENCE FRAMING

- a. Ensure posts installed in concrete are plumb vertically and that tops are aligned, as required, until the concrete foundations have set.
- b. Do not install [rail(s),] [bracing,] [tension wire,] [barbed wire,] fabric, or gates on posts until at least 7 days after placement of concrete foundations, or until the concrete attains 75% of its minimum 28-day compressive strength, whichever is longer. Do not stretch fabric [or wires] [, or tighten truss rods] until the concrete has attained its full design strength.
- c. [Install top rail in lengths of 21 feet6.40 meters, unless directed otherwise by the manufacturer's instructions.]

### 3.4 CHAIN LINK FABRIC INSTALLATION

- a. Install fabric on security side and attach so that fabric remains in tension after pulling force is released.
- b. [Install tension wire before stretching fabric and attach to each post with ties of at least the same gage as the tension wire.]

### 3.5 GATE INSTALLATION

- a. Install gates plumb, level, and secure for full opening without interference.
- b. Install ground-set items (such as stops and keepers) into concrete as recommended by the manufacturer.

### 3.6 ACCESSORIES AND HARDWARE

- a. Install brace assemblies so that posts are plumb when diagonal truss rod is at proper tension.
- b. Bend ends of tie wires to minimize hazard to persons and clothing.
- c. Install nuts on side of fence opposite fabric side for added security.
- d. Attach hardware by means that will prevent unauthorized removal.
- e. Adjust gate hardware for smooth operation.
- f. [Install Type I barbed wire arms such that the wires are on the security side of the fence.]

### 3.7 GALVANIZED COATING REPAIR

Inspect the completed fencing system for damaged galvanized coatings. In locations where the coating is damaged, touch up damaged galvanized coating with cold-applied zinc-rich coating in accordance with ASTM A 780, or as otherwise instructed by the manufacturer.

### 3.8 CLEANING

After installation of fencing system is complete, clean up debris and unused material, and remove from the site.

-- End of Section --